Resumé of General Stratigraphic Relations in the Atlantic Coastal Plain from New Jersey to South Carolina. N. H. DARTON, Washington, D. C.

A series of sections were exhibited to show the distribution and variations of the principal coastal plain formations, and there were pointed out some bearings of the features on the geologic history. The data are based largely on the author's studies, but they also combine a resumé of some observations of others.

Both these papers were read together and were illustrated by figured geological sections based on the recently acquired records of artesian wells. There were five, viz: Philadelphia to Wildwood, N. J.; Washington to Crisfield, Md.; Richmond to Norfolk; Orangeburg to Charleston; Aikin to Beaufort, S. C. They illustrated the relations of the granitic Archean rocks to the Jurassic Potomac formation, the Cretaceous Magothy and Severn, the Eocene Pamunkey and the Miocene Chesapeake. Paleontologic details would have made the first paper clearer. An interesting and important point is the discovery of Newark sandstone in a deep well at Florence, S. C., far south of our previously recorded locations. D. W. Langdon, in discussion, raised the paleontologic point referred to above.

The last paper read was by Arthur Keith, '*Some Stages of Appalachian Erosion.*' The paper was a general review of the drainage systems of the area in question, and of the factors which had contributed to develop its present topography.

C. H. Hitchcock then presented a resolution of thanks to the local committee and to the authorities of the University of Pennsylvania for their hospitality and many courtesies. It was unanimously passed and then the eighth annual meeting of the Society adjourned.

The following papers, although announced in the program, were not read either because their authors were absent from the meeting, or because they were not present when the papers were reached in regular order:

The Natchez Formations. T. C. CHAMBERLIN.

Disintegration and Decomposition of Diabase at Medford, Mass. GEORGE P. MERRILL, Washington D. C.

On the Geographic Relations of the Granites and Porphyries in the Eastern Part of the Ozarks. CHARLES R. KEYES, Jefferson City, Mo.

The Cerrillos Coal Field of New Mexico. JOHN J. STEVENSON, New York, N. Y.

Pre-glacial and Post-glacial Channels of the Cuyahoga and Rocky Rivers. WARREN UPHAM, St. Paul, Minn.

J. F. KEMP.

COLUMBIA COLLEGE.

AMERICAN MORPHOLOGICAL SOCIETY.

OF the three sessions held by the Morphological Society the first was mainly devoted to business questions, of which the most important related to the plan of affiliation with the Society of Naturalists brought forward at the meeting of 1894. This plan was rejected on the ground that most of the other societies had taken action adverse to it. It was, however, recommended that coöperative action by all the societies should be urged in order to assure a common place and time of meeting. A resolution was adopted endorsing the action of the Smithsonian Institution in maintaining an American table at the Zoölogical Station at Naples, and expressing the earnest hope of the Society that the table may be continued in order that the unrivalled facilities of the Station may be open to American investigators in the future as in the past.

The scientific program was as follows:

Friday, December 27, 1895.

C. S. Minot: *Panplasm.*

B. B. Griffin: *The History of the Centrosome in Thalassema.*

E. B. Wilson: *The Centrosome in its Relation to Fixing and Staining Agents.*

T. H. Morgan: *The Production of Artificial Archoplasmic Centers.*

F. R. Lillie: *On the Smallest Parts of Stentor Capable of Regeneration.*

E. G. Conklin: *Cell-size and Body-size.*

T. H. Morgan: *The Development of Isolated Blastomeres of the Egg of Amphioxus.*

G. W. Field: *Spermatogenesis of Amphioxus.* (By title only.)

Saturday, December 28, 1895.

Bashford Dean: *Gastrulation of Teleosts.*

W. A. Locy: *Further Evidence of Primitive Metamerism in Birds and Amphibia.* (By title only.)

G. H. Parker: *Pigment Changes in the Eye of Palæmonetes.*

G. H. Parker: *Reaction of Metridium to Food and Other Substances.*

C. W. Stiles: *Some Points in the Anatomy of Anoplocephaline Cestodes.*

R. P. Bigelow: *Development of Cassiopea from Buds.*

A novel feature of the scientific sessions was the grouping of allied papers, a plan which proved very successful as a stimulus to general discussion. The first session was entirely taken up with papers on protoplasm, the cell and the closely related subject of experimental embryology. Professor Minot, of Harvard, opened with a paper on 'Panplasm,' in which the nature of protoplasmic organization was critically discussed. The doctrine now advocated by so many cytologists, that protoplasm is compounded of elementary organic units, such as the 'pangens of de Vries, the 'idioblasts' of Hertwig, the 'biophores' of Weismann, etc., was rejected *in toto*. Protoplasm, he maintained, is a mixture of substances, not of self-propagating units; and the attempts to distinguish between living substance and the 'lifeless' substances associated with it are, in the main, wide of the mark. The entire substance of the cell, the 'panplasm,' is the only real unit and must be regarded as a whole.

Mr. Branley B. Griffin (Columbia) described the fertilization of the egg and the history of the centrosome in the gephyrean worm, *Thalassema*. As in echinoderms and many other forms there is no 'Quadrille of Centers.' The centrosome of fertilization is derived from the supermatozoön and the egg-centrosome degenerates after the formation of the polar bodies. The sperm-centrosome may be continuously traced, as a distinct black granule, throughout all the stages of fertilization into the cleavage-stages, and at no time disappears. The centrosome of the first spindle becomes double at a very early period and passes to the outer periphery of the centrosphere, where a minute amphiaster is formed on each side as early as the mid-anaphase of the first cleavage. This amphiaster is the precocious preparation for the second cleavage.

Prof. E. B. Wilson (Columbia) called attention to the fact that the existing confusion regarding the centrosome and attraction sphere is probably due in part to the varying effects of reagents on these structures. In *Thalassema*, as shown by his own observations and those of the preceding speaker, the centrosome appears as a minute black granule after hardening with sublimate or picro-acetic and staining with iron hæmatoxylin. After sublimate-acetic neither centrosomes nor deutoplasm spheres stain, though the general fixation is not inferior to that yielded by the other methods. This suggests the possibility that in *Toxopneustes*, likewise, the sublimate-acetic mixture may cause the centrosomes to disappear from view. It was however recalled that in certain stages of this same form they are not shown after other reagents, such as sublimate and Hermann's fluid; that they are perfectly shown in the maturation spindles of the starfish after sublimate-acetic, but afterwards disappear; and that Hill's ob-

servations (sublimate-acetic) and Boveri's (picro-acetic) differ both from each other and from the speaker's. The whole subject, therefore, requires further study with special reference to the technique.

The following paper by Prof. T. H. Morgan (Bryn Mawr), on the production of artificial archoplasmic centers, was of special interest and led to much discussion. Unfertilized, as well as fertilized, eggs of sea urchins and ascidians, when treated with salt solutions of a certain concentration, become filled with numerous asters which show in many respects a close resemblance to the normal asters of dividing cells, and may contain a body similar to a centrosome. This cannot be due to polyspermy, because the eggs contain but a single nucleus, and for other reasons. Prof. Morgan is inclined to regard the asters as new formations produced by a rearrangement of the protoplasm under abnormal conditions. In a second paper Prof. Morgan described the development of dwarf larvæ from isolated blastomeres of *Amphioxus*, with reference to the numerical relations of the cells. Half-larvæ and quarter-larvæ always possess a number of cells not precisely one-half or one-quarter the normal number of the full sized animal at the same stage but somewhat greater, and these partial larvæ show a marked tendency, not however fully carried out, to use the same number of cells in the formation of their organs as that used by the full sized larva. Thus the notochord is always formed of three cells (in cross-section) in larvæ of all sizes. These results show that there is an inherited tendency to produce a definite number of cells for the formation of particular organs, irrespective of the total size of the embryo.

The paper of Prof. Conklin (University of Pennsylvania), on 'Cell-size and Body-size,' discussed a nearly related question from a different point of view. Observations on the marine gasteropod, *Crepidula*, show that adult animals vary enormously in size, the dwarfs having in some cases not more than $\frac{1}{25}$ the volume of the giants. The eggs are, however, always of the same size and are proportional in number to the size of the adult. Microscopical study of the tissues shows that the same is true of the tissue cells. Measurements of cells from various tissues, representing derivatives of all the germ layers (ectodermal epithelia, kidney cells, liver cells, alimentary epithelia, etc.), show that they are not perceptibly smaller in the dwarfs than in the giants. Prof. Conklin, therefore, concludes that body size is not dependent on cell size, but on the total *number* of cells, a result which agrees with that reached by botanists, but differs somewhat from that obtained through a study of the nervous system in higher animals. His conclusion agrees only in a measure with Morgan's results on *Amphioxus;* for the latter indicate that the number of cells in dwarfs, while considerably less than in those of normal individuals, is not strictly proportional to the body size.

Dr. Lillie (University of Michigan) presented the results of a research on the limit of size in the regeneration of *Stentor*. These animals, like eggs, may be shaken into fragments of various sizes, among which may be found both nucleated and non-nucleated pieces and also naked nuclear fragments. Only such fragments as contain both cytoplasm and nuclear substance are capable of regeneration. Complete regeneration may take place in a fragment containing only 1-27 the bulk of an entire animal. Smaller fragments cannot regenerate. This result is remarkably near to that of Boveri, who has found that the limit of size in egg fragments capable of producing a complete larva (in sea urchins) is approximately 1-20 the volume of the entire egg.

The second session was devoted in the main to papers on anatomy and develop-

ment, varied by physiological contributions from Dr. Parker.

Dr. Dean (Columbia) discussed the gastrulation of teleosts from a comparative point of view, urging that a key to its interpretation must be sought in the development of ganoids. Lepidosteus, Acipenser and Amia form a progressive series culminating in the teleost, the length of the neural plate gradually increasing from 90° to more than 200°, the ventral lip of the blastopore becoming less clearly marked, and the neural plate becoming more and more concentrated towards the median plane. The following interpretation of the of the parts of the teleostean gastrula was adopted: dorsal and ventral lip of the blastopore as identified by Haeckel, Ryder, H. V. Wilson and others; 'ventral mesoblast' of H. V. Wilson as entoblast; Kupffer's vesicle as the notch under the dorsal lip of the blastopore, caused mechanically in the growth of the Randwulst; periblast as the highly differentiated outer layer of the yolk mass, which enables the enclosing growth of the blastoderm, yet preserves in a most perfect way its incremental relations with the adjacent tissues of the embryo. In view of the presence of medullary folds in Lepidosteus and Acipenser, rudimentary in the former, perfect in the latter, the solid neural plate of the embryonic Teleost must be regarded as a secondary condition, due to the mechanical needs of the embryo in its precocious growth.

Dr. Parker's (Harvard) first paper considered the pigment changes in the eye of the shrimp *Palæmonetes* with especial reference to the nature of the reflex-action involved.* The pigment-changes called forth by the action of light take place in the typical manner in animals after section of the optic nerve, showing that they are not determined by a reflex center in the cerebral ganglia, but by a local action which may be due to the direct action of light on the pigment cells.

In his second paper Dr. Parker gave an account of experiments on sea anemones which led to interesting results. These animals respond in a definite manner either to solid or dissolved food matters, and the sense by which they are perceived resides in the tentacles, the oral disc and the lips of the mouth. Food is taken in through the action of cilia covering the tentacles and the entire oral region. Those of the lips and œsophagus work inwards; those of the tentacles work outwards towards the lips. If nutritious substances are placed on the tentacles the latter bend inwards towards the mouth, into which the food is therefore swept by the cilia; innutritious bodies, on the other hand, cause the tentacles to be extended so that such bodies are carried out to the tips and thrown off. The most interesting results relate to the reversal of the ciliary action that occurs under certain conditions. Inert substances, such as carmine, may be at first swept into the mouth, but are afterwards thrown out by a reversed action of the œsophageal cilia. The action of the cilia is therefore under the control of the animal, which is moreover capable of certain degree of education. If animals be fed with fragments of meat and pieces of paper soaked in meat juice, both are at first taken into the stomach, but the paper fragments are afterwards thrown out. After a number of trials (seventeen or more) the animal learns to discriminate, the paper being rejected and the meat swallowed. Their memory is however short lived, for on the following day the lesson must be learned anew.

Dr. Stiles, of Washington, discussed a number of new points in the anatomy of tape worms, and exhibited a large number of plates of new and little-known species. He

* Unfortunately an adequate review of this paper cannot be given.

distributed specimens of Demodex and Coccidium parasites for class work, and made a plea for a more adequate study of parasites in college work as a preparation for medical studies.

Dr. Bigelow (Institute of Technology) described observations on the budding of the scyphistoma of Cassiopea, which tend to uphold the views of Claus and are opposed to those of Götte. The bud forms in the plane of one of the principal radii as an evagination of both layers. It is set free as a ciliated free-swimming planula and the mouth is afterwards developed, not at the distal, but the proximal or basal end. No stomodæal invagination of ectoderm occurs, and the proboscis is therefore lined by entoderm. The gastric pouches do not arise as evaginations, but by the inward growth of septa from the mesoglœa. The first tentacles to be formed are the four per-radial; the numbers in following stages are normally 8, 16 and 32.

CURRENT NOTES ON PHYSIOGRAPHY.

TOPOGRAPHICAL MAP OF ITALY.

FOUR sheets (Nos. 7, 18, 33, 46) of the topographical map of Italy—1 : 100,000—published recently by the *Istituto geografico militare*, cover a stretch of country from the crest of the Alps in the Bernina group, with many glaciers, to the northern side of the plain of the Po, where the river Adda emerges from the foothills. The northernmost sheet includes the divide between the Maira and the Inn, separating the waters of the Po and the Danube; here the northward migration of the divide, as described by Heim, has caused the formation of the little lakes of the Engadine (Die Seen des Oberengadin, Jahrb. Schw. Alpenklub, XV, 429); certain back-handed branches of the Maira, once tributaries of the Inn, are clearly shown. The second sheet exhibits the deep longitudinal valley of the Adda about Sondrio, 2,000 meters beneath the mountains on either side, the stream being continually thrown to one or the other side of its well-graded floor by the large alluvial fans of lateral streams. The two southern sheets show a number of torrential streams with tangled channels flowing southward in almost parallel courses across the great alluvial plain, whose slope is here about twenty feet to the mile; the banks of the streams often being somewhat higher than the ground between them, and thus indicating that portions of the plain consist of numerous alluvial fans, confluent laterally; a form very well adapted to the construction of the numerous canals that are led from the streams to the fields. The maps being printed in a single black impression, it is often difficult to distinguish streams and canals from roads.

MAP OF THE GERMAN EMPIRE. 1 : 1,000,000.

SEVERAL interesting features appear on certain sheets of the German topographical map, published last year and this. One of the broad dry valleys cut in the Piedmont slope of Bavaria by some extinct glacial streams, is exhibited on the Mindelsheim (636) and Burgau (622) sheets. The tangled channel of the torrential Inn and a glimpse of the shallow canyon of the Danube below Passau are found on the Neuhaus-a-Inn, sheet (628). Further up stream the Inn manifests a peculiarly strong tendency to follow the right-hand side of its broad valley floor, here at least two miles from side to side (Landau sheet 612). The great north-facing Jurassic escarpment of the Swabian Alp in Wurtemburg, is in part shown on the Aalen sheet (592), east of Stuttgart; the location of Aalen at the northern base of the escarpment, and of the road and railroad southward across the Alp from it, depend on the occurrence there of one of the several notches in the rim of the upland, representing the trough of a beheaded river, whose winding lower course